Remarks

Reconsideration of this Application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-24 are pending in the application, with claims 1, 12 and 14 being the independent claims. Claims 4, 8, 9, 17 and 22 are sought to be amended to address minor grammatical errors. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the above amendment and the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Claim Objections

The Examiner has objected to claims 4, 8, 9, and 17 because of various informalities. In particular, the Examiner noted that in claim 4, line 3, "and" should be --or--, in claim 8, line 2, "vectors" should be --vector--, in claim 9, line 3, "and" should be --or--, and in claim 17, line 3, "and" should be --or--. Applicant has amended these claims accordingly, and therefore respectfully request that these claim objections be reconsidered and withdrawn.

Rejections under 35 U.S.C. § 102

The Examiner has rejected claims 1, 2, 7, 12-15 and 20 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,007,092 to Galand *et al.* ("Galand"). For the reasons set forth below, Applicant respectfully traverses.

Independent claim 1 is directed to a method in a Noise Feedback Coding (NFC) system of searching N predetermined Vector Quantization (VQ) codevectors for a preferred one of the N VQ codevectors to be used in coding a speech or audio signal. The method includes the steps of:

> (a) predicting the speech signal to derive a residual signal;
>
> (b) deriving a VQ input vector corresponding to a VQ error vector, based on the residual signal and a corresponding one of the N VQ codevectors;
>
> (c) repeating steps (b) for each of the N VQ codevectors to produce N VQ error vectors corresponding to the N VQ codevectors; and
>
> (d) selecting the preferred VQ codevector as a VQ output vector corresponding to the residual signal based on the N VQ error vectors.

This approach to selecting a preferred VQ codevector is quite different from conventional methods. In conventional methods, a vector quantizer receives a single VQ input vector and then searches a VQ codebook to find the "nearest neighbor" to the input vector. This nearest neighbor is selected as the VQ output vector. However, as described in the specification of the present application, this conventional type of vector quantizer will not work with the novel NFC systems disclosed therein:

> If the residual quantizer is a vector quantizer, the encoder structure of FIG. 7 cannot be used directly as is. An alternative approach and alternative structures need to be used. To see this, consider a conventional vector quantizer with a vector dimension K. Normally, an input vector is presented to the vector quantizer, and the vector quantizer searches through all codevectors in its codebook to find the nearest

> neighbor to the input vector. The winning codevector is the VQ output vector, and the corresponding address of that codevector is the quantizer out codebook index. If such a conventional VQ scheme is to be used with the codec structure in FIG. 7, then we need to determine *K* samples of the quantizer input *u(n)* at a time. Determining the first sample of u(n) in the VQ input vector is not a problem, as we have already shown how to do that in the last section. ***However, the second through the K-th samples of the VQ input vector cannot be determined, because they depend on the first through the (K-1)-th samples of the VQ output vector of the signal uq(n), which have not been determined yet.***

See Specification at paragraph [0202] (emphasis added). The method of claim 1 addresses the "chicken and the egg" problem set forth in the highlighted text by deriving multiple VQ input vectors—one for each VQ codevector—and then selecting a preferred VQ codevector based on VQ error vectors associated with each of the derived input vectors. An exemplary NFC system that employs the method of claim 1 is illustrated in FIG. 13A of the present application and described in associated text at paragraphs [0204] through [0213] of the specification.

Galand is directed to a Code-Excited Linear Prediction (CELP) coder that uses a vector quantizer having a dynamically adaptable codebook. The purported innovation of Galand is related to the fact that the VQ codebook can be dynamically updated after every sub-block of speech samples. However, aside from this feature, the vector quantizer in Galand is identical to conventional vector quantizers as described in the present application in that Galand's vector quantizer receives a single input vector e(n) and then selects a codeword that most nearly matches the input vector as the output codeword. As described in Galand:

> Briefly stated, the CELP coder includes a vector quantizer (VQ) searching device and a codebook (CB). Encoding therein is performed on a block of samples basis, and involves finding a block of codebook stored samples (i.e. a codeword) best matching the e(n) block to be encoded. Best matching means here providing the lowest global block difference energy (mean squared error) assuming a gain factor G be considered

> between the codeword and the block of e(n) samples to be CELP coded. One needs then simply code/quantize the codeword address k and gain G, within a coder C (13).

See Galand, col. 2, ll. 5-17. Thus, Galand nowhere teaches or suggests deriving multiple VQ input vectors—one for each VQ codevector—and then selecting a preferred VQ codevector based on VQ error vectors associated with each of the derived input vectors, as set forth in independent claim 1.

The Examiner has equated the recited step of "deriving a VQ input vector" with the generation of error residual signal e(n) in Galand's coder. However, if the signal e(n) is the VQ input vector as suggested by the Examiner, Galand's coder does not generate multiple VQ input vectors—one for each VQ codevector—prior to selecting a preferred VQ codevector as required by step (c) of claim 1. The Examiner asserts that this feature is taught by Galand because e(n) is compared to each entry in the VQ codebook, citing to text at column 2, lines 7-10 in Galand; however, this is simply a statement that Galand's vector quantizer operates in a conventional manner by trying to find the "nearest neighbor" to e(n) in the VQ codebook. This is not the same thing as deriving multiple versions of the e(n) signal prior to selecting a preferred VQ codevector, which is nowhere taught or suggested by Galand.

Since Galand does not teach or suggest each and every feature of independent claim 1, it cannot anticipate that claim. Accordingly, the Examiner's rejection of claim 1 under 35 U.S.C. § 102(b) is traversed and Applicant respectfully requests that the rejection be reconsidered and withdrawn. Additionally, claims 2 and 7 are not anticipated by Galand for the same reasons as independent claim 1 from which they depend and further in view of their own respective features. Accordingly, the Examiner's

rejection of claims 2 and 7 under 35 U.S.C. § 102(b) is likewise traversed and Applicant respectfully requests that the rejection be reconsidered and withdrawn.

Independent claim 12 is directed to a method in an NFC system of searching N predetermined VQ codevectors for a preferred one of the N VQ codevectors to be used in coding a speech or audio signal. The method includes the steps of:

> (a) predicting the speech signal to derive a residual signal;
>
> (b) deriving N VQ input vectors each based on the residual signal and a corresponding one of the N VQ codevectors, each of the N VQ input vectors corresponding to one of N VQ error vectors; and
>
> (c) selecting the preferred one of the N VQ codevectors as a VQ output vector corresponding to the residual signal, based on the N VQ error vectors.

The method of claim 12 includes, in part, the feature of deriving "N VQ input vectors" before selecting a preferred one of N VQ codevectors as a VQ output vector based on VQ error vectors associated with each of the derived input vectors. As discussed above in reference to claim 1, Galand does not teach or suggest this feature since, in accordance with conventional techniques, Galand uses a single VQ input vector e(n) to select a preferred VQ codevector.

Since Galand does not teach or suggest each and every feature of independent claim 12, it cannot anticipate that claim. Accordingly, the Examiner's rejection of claim 12 under 35 U.S.C. § 102(b) is traversed and Applicant respectfully requests that the rejection be reconsidered and withdrawn. Additionally, claim 13 is not anticipated by Galand for the same reasons as independent claim 12 from which it depends and further in view of its own respective features. Accordingly, the Examiner's rejection of claim 13 under 35 U.S.C. § 102(b) is likewise traversed and Applicant respectfully requests that the rejection be reconsidered and withdrawn.

Independent claim 14 is directed to an NFC system for searching N VQ codevectors stored in a VQ codebook for a preferred one of the N VQ codevectors to be used for coding a speech or audio signal. The system includes:

> predictor logic adapted to predict the speech signal to derive a residual signal;
>
> an input vector deriver adapted to derive N VQ input vectors each corresponding to one of N VQ error vectors, based on the residual signal and a corresponding one of the N VQ codevectors; and
>
> a selector adapted to select the preferred one of the N VQ codevectors as a VQ output vector corresponding to the residual signal, based on the N VQ error vectors.

The system of claim 14 includes, in part, an "input vector deriver" adapted to derive N VQ input vectors and a "selector" adapted to selects a preferred one of N VQ codevectors based on error vectors associated with each of the derived input vectors. As discussed above in reference to claim 1, Galand does not teach or suggest these features since, in accordance with conventional techniques, Galand uses a single VQ input vector e(n) to select a preferred VQ codevector.

Since Galand does not teach or suggest each and every feature of independent claim 14, it cannot anticipate that claim. Accordingly, the Examiner's rejection of claim 14 under 35 U.S.C. § 102(b) is traversed and Applicant respectfully requests that the rejection be reconsidered and withdrawn. Additionally, claims 15 and 20 are not anticipated by Galand for the same reasons as independent claim 14 from which they depend and further in view of their own respective features. Accordingly, the Examiner's rejection of claims 15 and 20 under 35 U.S.C. § 102(b) is likewise traversed and Applicant respectfully requests that the rejection be reconsidered and withdrawn.

Other Matters

The Examiner has objected to claims 3-6, 8-11, 16-19 and 21-24 as being dependent upon a rejected base claim. However, based on the foregoing remarks, Applicant has traversed the rejection of the base claims upon which these claims depend. Accordingly, Applicant respectfully requests that the objection to claims 3-6, 8-11, 16-19 and 21-24 be reconsidered and withdrawn.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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